

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY, 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: APPLIED MECHANICS

SEAT NO. _____
SEMESTER: 1st
PROGRAMME: Civil Engg.
CODE: 160001

INSTRUCTIONS:

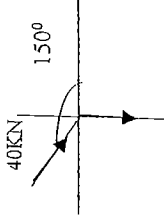
- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt all questions.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-prog.) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

Q.1

Attempt ANY SIX of the following.

- (1) Define. Rigid body, statics.
- (2) State parallelogram law of forces.
- (3) State Lami's theorem
- (4) Differentiate between Resultant & Equilibrant.
- (5) Resolve a force of 80 KN along two directions making angles 30° & 20° with it on opposite sides.
- (6) What is varignon's theorem of moment?
- (7) Resolve a force of 40KN inclined at 150° with axis as shown in fig.

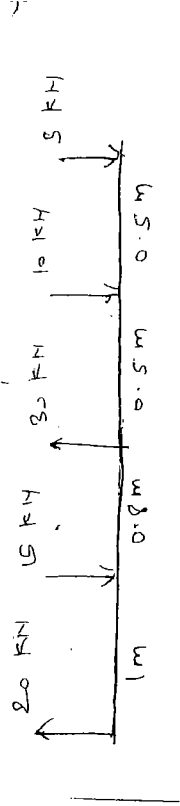


- (8) Differentiate between Mass and Weight.

Q.2

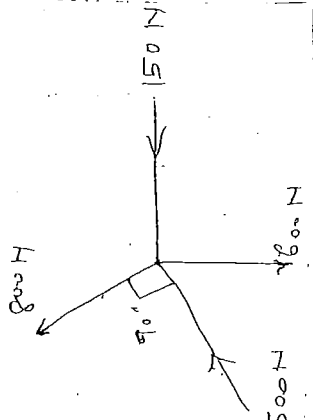
Attempt ANY FOUR of the following.

- (a) Find the resultant & point of application of resultant for force system as shown in fig.



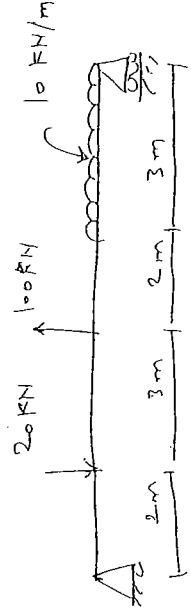
- (b) State properties of couple.
- (c) What are the different types of loads & end support of beam?
- (d) The sum of two forces is 9N. Their resultant which is perpendicular to the smaller force is of 6N. Find magnitude of the force.
- (e) Find the angle between two equal forces P, if their resultant is also equal to P.

(f) Find the resultant of all the forces as shown in fig.

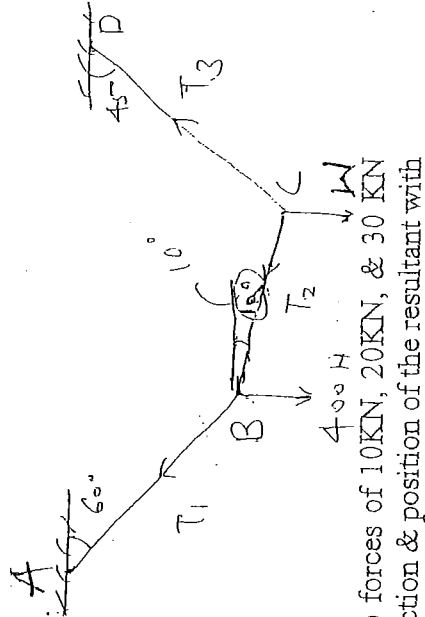


Q.3 Attempt ANY TWO of the following. (16)

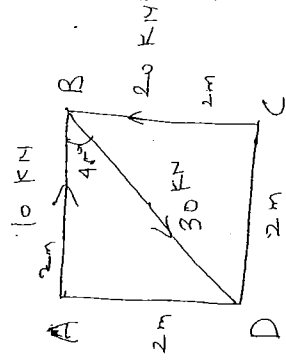
(a) For the beam shown in fig. calculate support reactions using analytical method.



(b) Find the weight 'W' & tension in the strings.



(c) A square ABCD of 2m side is subjected to forces of 10kN, 20kN, & 30 kN along AB, CB, & BD. Find magnitude, direction & position of the resultant with respect to A.

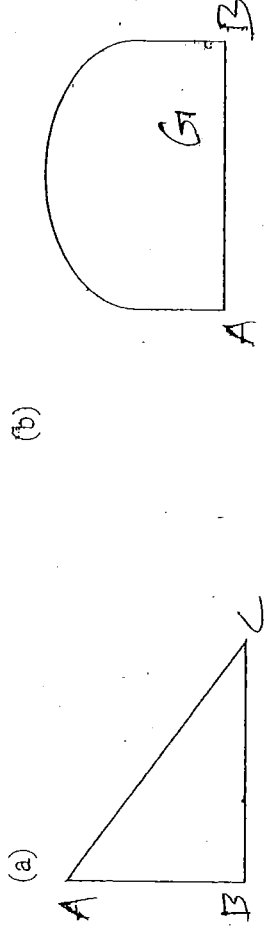


SECTION-II

Q.4 Attempt ANY SIX of the following. (18)

- (1) State law of polygon of forces.
- (2) Define angle of repose.
- (3) Define centre of gravity.
- (4) Define - Mechanical Advantage & Efficiency of Machine.

- (5) Find formula for centroid of following fig. with usual notations.



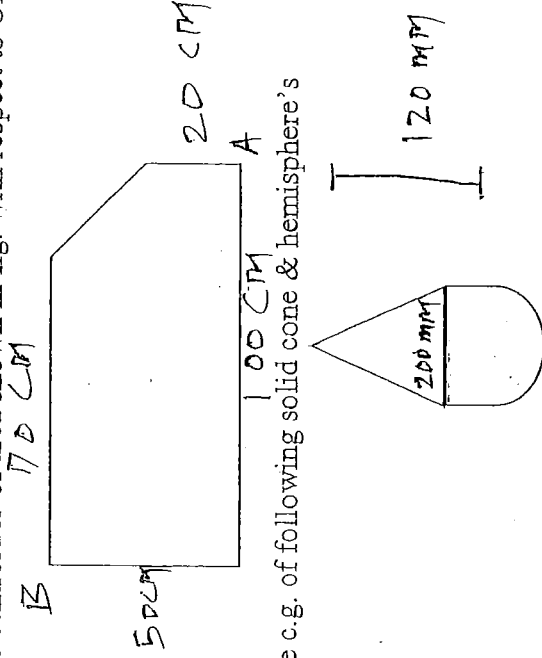
- (6) What is law of machine?
 (7) A body of weight 2000N rests in a horizontal plane. If the coefficient of friction is 0.4, find the horizontal force required to be applied parallel to the plane to move the body.
 (8) The velocity ratio of certain machine is 50. Determine the effort required to lift a load of 1500N if the efficiency of machine is 40%.

Q.5

Attempt ANY FOUR of the following.

(16)

- (a) A body weighing 150N is resting on a rough horizontal plane & can be just moved by a force of 50N applied horizontally. Find the coefficient of friction. Also find magnitude & direction of the resultant reaction.
 (b) In a machine an effort of 15N can lift a load of 300N & an effort of 25N can lift a load of 500N. Find law of machine.
 (c) Find the centroid \bar{X} of area shown in fig. with respect to OB line.



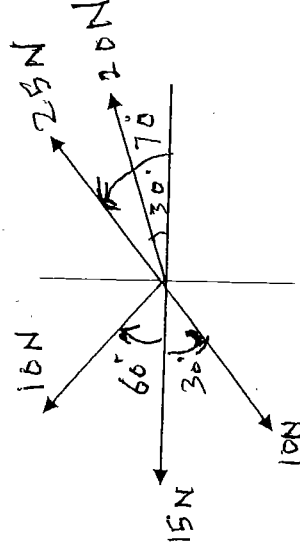
- (d) Find the c.g. of following solid cone & hemisphere's
 (e) What are the advantages & disadvantages of friction?
 (f) In differential axle & wheel the diameter of wheel is 400mm & the dia of axis are 100mm & 80mm. If an effort of 50N can lift a load of 1500N. Find V.R. & efficiency of machine.

Q.6

Attempt ANY TWO of the following.

(16)

- (1) Find graphically the resultant of concurrent force system shown in fig.



- (2) Following observations were made in an experiment as simple machine with V.R. = 60 Find law of machine & efficiency at load of 300N. Draw a graph.

Load	Effort
100N	10N
200N	14N

- (3) A ladder of weight 400N & length 10m is supported on smooth wall with its lower end 4m from the wall. The coefficient of friction between the floor & the ladder is 0.3. Show the forces acting on the ladder & find frictional force at floor.

TIME ALLOWED: 03 HOURS
 MAXIMUM MARKS: 100
 COURSE: BASIC MATHEMATICS

SEAT NO. _____
 SEMESTER: I
 PROGRAMME: ALL
 CODE: 160002

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt **ALL** questions from Section-I and Section-II.
- (3) All questions are compulsory.
- (4) Illustrate your answers with neat sketches, wherever necessary.
- (5) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.

SECTION-I**Q.1****Attempt Any Six****(18)**

- (a) Evaluate : $\frac{1}{\log_3 6} + \frac{1}{\log_8 6} + \frac{1}{\log_9 6}$
- (b) Find k if $\begin{vmatrix} 2 & -k & 7 \\ 3 & -4 & 13 \\ 8 & -11 & 33 \end{vmatrix} = 0$
- (c) Find x and y satisfying the matrix equation $\begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix} \begin{bmatrix} x & y \\ 3 & -1 \end{bmatrix} = \begin{bmatrix} 7 & 0 \\ 9 & 4 \end{bmatrix}$
- (d) Use binomial theorem. Find approximate value of $\sqrt{30}$
- (e) Resolve into partial fractions $\frac{5x+1}{x^2+x-2}$
- (f) Find the 5th term of $(x+2y)^8$
- (g) If $A = \begin{bmatrix} 2 & 5 \\ 6 & 7 \end{bmatrix}$ find $A^2 + 4A + 2I$ where I is unit matrix
- (h) Find x if $\log_2(x^2 - 6x + 40) = 5$

Q.2**Attempt Any Four****(16)**

- (a) Resolve into partial fractions $\frac{2x+3}{x^2(x-1)}$
- (b) Find the middle terms in the expansion of $\left[3x - \frac{x^3}{6}\right]^9$
- (c) Solve the equation by using determinant method $x + y + z = 3$; $x - y + z = 1$, $x + y - 2z = 0$
- (d) If $A = \begin{bmatrix} 2 & -1 & 1 \\ 3 & -4 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 2 \\ -3 & 1 \\ 4 & -1 \end{bmatrix}$ Is the matrix AB non-singular?
- (e) Using properties of determinant show that $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} = 0$
- (f) Find K if $(1 + \sqrt{3})^4 + (1 - \sqrt{3})^4 = K$

Q.3**Attempt Any Two****(16)**

(a) Solve by matrix method

$$2x + 3y - z = -3, \quad 5x + y + 3z = 10, \quad 4x + 3y - 2z = -3$$

(b) The term independent of x in the expansion of $\left(x^3 + \frac{m}{x^8}\right)^{11}$ is 1320. Find m (c) Resolve into partial fractions $\frac{x^2+23x}{(x+3)(x^2+1)}$ **Q.4****Attempt Any Six of the following****(18)**(a) Prove that $\tan^{-1}\left(\frac{3}{4}\right) + \tan^{-1}\left(\frac{3}{5}\right) - \tan^{-1}\left(\frac{8}{19}\right) = \frac{\pi}{4}$ (b) Find the slope of the line $\frac{x}{6} + \frac{y}{4} = \frac{1}{3}$ (c) Find the equation of the circle having radius 2 and touching the y -axis at $(0, -3)$ (d) Find the equations of the tangent to the circle $x^2 + y^2 + 6x + 7 = 0$ at $(-2, 1)$ (e) Find the centre and radius of the circle $2x^2 + 2y^2 - 6x + 4y - 3 = 0$ (f) Find the value of K so that the lines $3x - y - 2 = 0$, $5x + ky - 3 = 0$ and $2x + y - 3 = 0$ are concurrent.(g) Find the acute angle between the line $2x + y - 1 = 0$ and $3x + y + 4 = 0$ (h) Prove that $1 + \tan \theta \cdot \tan 2\theta = \sec 2\theta$ **Q.5****Attempt Any Four of the following****(16)**(a) Find the distance between the lines $5x - 12y + 1 = 0$ and $10x = 24y + 1$ (b) Find the equations of the circle which passes through the points $(1, -2)$ and $(4, 3)$ and which has its centre on the line $3x + 4y = 7$ (c) Find the equations of the tangent at the point $(4, 5)$ on the circle $x^2 + y^2 - 4x + 2y - 35 = 0$ (d) In $\triangle ABC$, if $a = 25$ cm, $b = 52$ cm and $c = 63$ cm. Find $\sin A$.(e) In triangle ABC , if $A + B + C = \pi$, then prove that

$$\sin 2A + \sin 2B + \sin 2C = 4 \sin A \cdot \sin B \cdot \sin C$$

(f) Find the equations of the line passing through $(-1, 1)$ and making an angle 45° with the line $2x + 3y = 6$ **Q.6****Attempt Any Two of the following****(16)**(a) Prove that $\cos^2 A + \cos^2 B - \cos^2 C = 1 - 2 \sin A \cdot \sin B \cdot \cos C +$ (b) Find the equation of the perpendicular bisector of the line segment AB , where $A = (3, -4)$ and $B = (-4, 3)$ (c) Find the equations of the tangents to the circle $x^2 + y^2 - 6x - 4y + 5 = 0$, which makes an angle of 45° with the x -axis.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY- 2018

TIME ALLOWED: 03 HOURS

MAXIMUM MARKS: 100

COURSE: ENGINEERING DRAWING

SEAT NO. _____

SEMESTER: I

PROGRAMME: CIVIL ENGG.

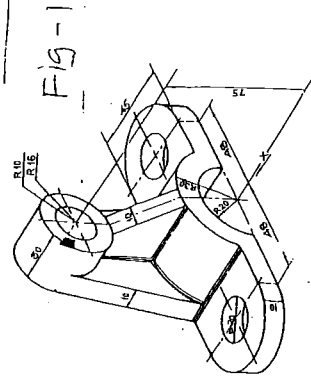
CODE: 160100

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) All Questions are compulsory.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

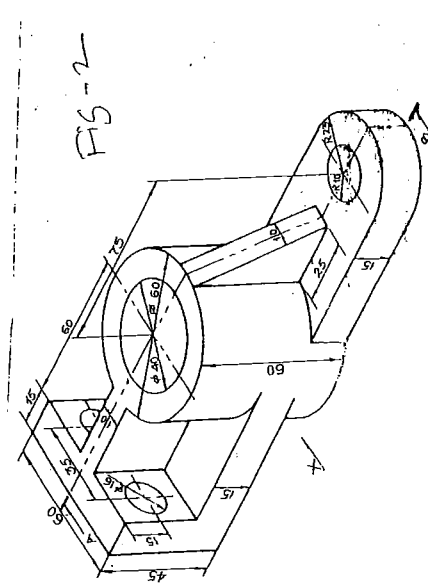
SECTION-I

- Q.1** (a) Fig No.1 shows pictorial via or an object. Draw the follow view by suing 1st angle method of projecting: i) Front view X-direction ii) Top view iii) Side view from left iv) Give dimension. **(20)**



OR

- (b) Fig. No.2 shows pictorial view A an object. Draw the follow vies by using 1st Angle method of projection. : i) Sectional front view along A-B ii) Right hand side view iii) Top view iv) Give dimension.



Y3 160100

Q.2

Attempt any two

(20)

- (a) Major axis of an ellipse B 100mm and minor axis 60mm Draw by concentric circle method the ellipse.
- (b) Draw parabola of 100mm horizontal distance and 60mm height with oblong method. (Rectangle.)
- (c) Draw a rectangular ---- when point P is (50,20)

Q.3

Attempt any one

(10)

- (a) A rhombus of 100mm and 50mm diagonal by its corner of higher diagonal on HP such that the diagonal is inclined at 45° to HP & surlier diagonal i) Include of 30° to VP Draw the program.
- (b) A hexagonal plate on 40mm girds is resting on one of its sides on HP. The surface makes 45° to HP and the side opposite to the side on HP makes 30° the VP, Draw the diagram of the plate.

SECTION-II

Q.4

Fig. 3 Show Two view of an object Draw Isometric view with 'o' as origin also Draw isometric Scale.

20 marks

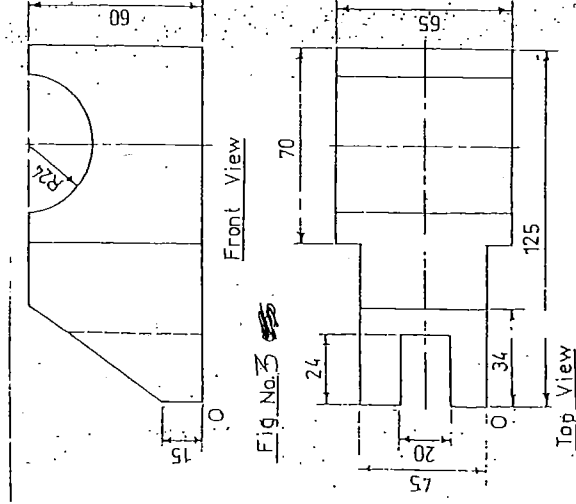
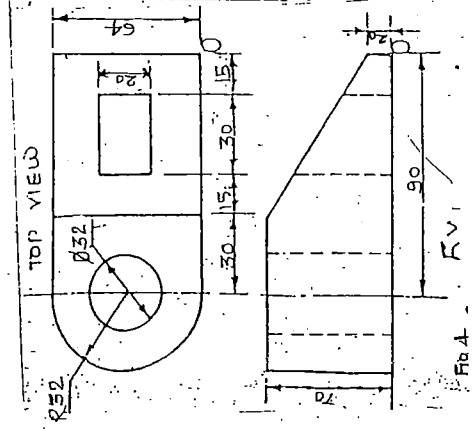


Fig. No. 3

OR

Fig. 4 Shows Two view of an object Draw its Isometric view. Draw isosceles also.



Q.5 Attempt any four

(20)

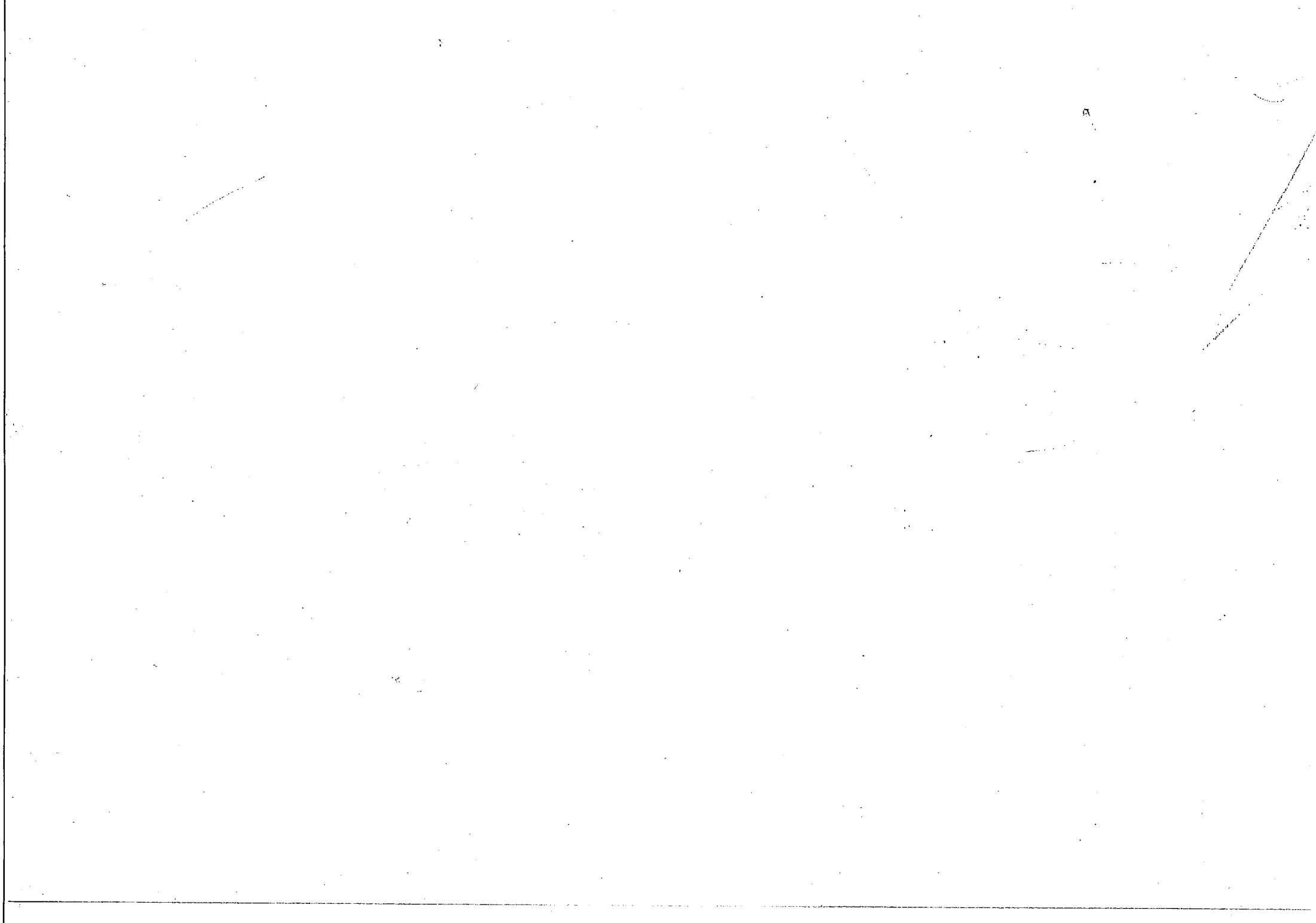
- Convention for external and internal thread.
- Rag foundation Bolt.
- Seller thread profile and Acme thread profile.
- Wing Nut (Two Views)
- Plane & spring Washer (Two views)
- Castle nut (Two Views)

Q.6

Attempt any one

(10)

- A hexagonal pyramid side of base 25mm and axis 60mm long rest with one of the edges of its base on HP and its axis is inclined at 30° to HP and parallel to V.P. Draw the projections.
- A pentagonal prism side of base 25mm and axis 50mm long rest with one of its base corner on HP. Such that its base makes an angle of 60° to HP and axis in parallel to VP Draw Projections.



TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: COMMUNICATION SKILL
SEAT NO. _____
SEMESTER: I/II
PROGRAMME: ALL
CODE: 160003

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt ALL questions from Section-I and Section-II.
- (3) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (4) Illustrate your answers with neat sketches, wherever necessary.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) The student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

Q.1. Answer the following (Any Six) (18)

- (a) How does the selection of media plays an important role in the process of communication?
- (b) State two characteristics of communication.
- (c) "Grapevine is closely related to the morale of the employees working in an organisation." Justify this statement with suitable examples.
- (d) "Communication is life-blood of any organisation" Justify the statement with the help of suitable examples.
- (e) Which type of communication is happening in the following situation? Explain its advantages
"The production manager of a company is communicating to the purchase manager of the same company."
- (f) What is sympathetic listening? Give an example.
- (g) "Positive feedback motivates the sender." How far do you agree with the given statement? Explain with an example.
- (h) How can the speaking skill be improved? (write any two techniques)

Q.2. Attempt (any Four) of the following. (16)

- (a) Do as directed
(i) _____ he is not eligible, he got the position (insert suitable conjunction)
(ii) The river is _____ the bridge (Insert suitable preposition)
(iii) Ganga is a holy river. (Under line noun & state its type)
(iv) Bombay is the most crowded city of India (change the degree)
- (b) Fill in the blanks with correct form of (tense) of the verb given in bracket.
(i) We _____ (work) on the project since 2011.
(ii) I _____ to her yesterday (speak)
(iii) I _____ (wait) for you at the station.
(iv) Where there _____ (be) a will, there _____ (be) away.
(i) Write antonyms of :- (a) Transparent (b) Confident
(ii) Write synonyms of :- (a) Guidance (b) Fragrance
- (c) Give two examples of each:- (a) Clipping (b) Compounding
- (d) Insert suitable heteronym-
- (e) (i) (a) He gave her a beautiful _____
(b) _____ me later, I will be at home.
(ii) (a) It's hot , so let's sit in the _____
(b) That _____ of red does not suit her.

- (f) Give examples of:- i) Capitonyms ii) Homophons

Q.3. Answer the following:- (any Two) (16)

- (a) What are the underlying causes that results in similarities or differences between systems of human and animal communication?
- (b) Write in detail any four types of reading.
- (c) Differentiate between listening & hearing.

SECTION-II

Q.4.

Answer the following (any Six)

(18)

- (a) Define essay. Explain any two types of essay.
- (b) Explain any three Cs of letter writing.
- (c) Explain the importance of business letters in business.
- (d) Nothing succeeds like a success. (Identify the tense and rewrite in simple future tense)
- (e) Give two examples of –
 - (i) Backformation
 - (ii) Conversion
- (f) Give two examples of present perfect tense.
- (g) Use 'a', 'am', 'the' as articles in your own single sentence.
- (h) Make verb
 - (i) Private
 - (ii) Note

Q.5.

Answer the following (any Four)

(16)

- (a) Write you resume without disclosing your identity?
- (b) As a store keeper of you organization place an order for office furniture with Décor furniture Bandra (west)
- (c) Oxford international school requires first class B.Com graduate for the post of Accountant, Write an application to the Headmaster of school for the said post.
- (d) Recently you purchased some electronics from shop located in your area, in spite of requesting many times the shopkeeper gives you bill without GST No. Write complaint letter to sale & tax inspector of your area to take strong action against shopkeeper.
- (e) Give the list of Diphthongs.
- (f) State Four qualities of report.

Q.6.

Answer the following (any Two)

(16)

- (a) As a chief construction engineer, investigate the reasons and submit you report on leakages from ceiling in newly constructed building.
- (b) Write an essay on any one –
- (c)
 - (i) Importance of value education
 - (ii) India – an emerging superpowerRead the unseen passage and answer the questions.

A man or woman makes a direct contact with society in two ways: as a member of some familial, professional or religious group, or as a member of a crowd. Groups are incapable of being as moral and intelligent as the individuals who form them: a crowd is chaotic, has no purpose of its own, and is capable of anything except intelligent action and realistic thinking.

Assembled in a crowd, people loose their power of reasoning and their capacity for moral choice. Their suggestibility is increased to the point where they cease to have any judgement or a will of their own. They become very excitable; they loose all sense of individual or collective responsibility. They are subjected to sudden excesses of rage, enthusiasm and panic. In a word, a man in a crowd behaves as though he had swallowed a large dose of some powerful intoxicant. He is a victim of what I have called 'herd poisoning'. Herd poison is an active, extravagant drug. The crowd intoxicated individual escapes from responsibility, intelligence and morality into a kind of frantic, animal mindlessness.

- 1] Which idea is predominantly expressed in this passage? (01)
- 2] Mention the two ways in which a man or woman makes direct contact with society. (02)
- 3] What is "Herd Poison"? (01)
- 4] How does the author describe the chaotic behavior of man? (01)
- 5] Mention two extreme behavioural patterns of man. (01)
- 6] With whom is a man in a crowd compared? Why? (02)

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: ENGINEERING MATHEMATICS

SEAT NO. _____
SEMESTER: II
PROGRAMME: ALL
CODE: 160008

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt all questions each from Section I & Section II.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

Q.1

Attempt Any Six out of Eight

(18)

- (a) If $f(x) = x^2 - 3x + 2$, find $f(1) + f(3)$
- (b) If $f(x) = 2x + 5$, $g(x) = x^2 - x$ find fog
- (c) Evaluate $\lim_{x \rightarrow 2} \frac{x^{10} - 1024}{x^5 - 32}$
- (d) If $f(x) = 4x^4 + 3 \cos x + x \cdot \sin x + 1$
- (e) Evaluate : $\lim_{x \rightarrow 2} \frac{x-2}{\sqrt{x}-\sqrt{2}}$
- (f) Evaluate: $\lim_{x \rightarrow a} \frac{x^{10} - a^{10}}{x - a}$
- (g) Evaluate : $\lim_{\theta \rightarrow \pi/2} \frac{1 - \sin^3 \theta}{\cos^2 \theta}$
- (h) Evaluate : $\lim_{x \rightarrow 0} \frac{e^{7x} - 1}{e^{3x} - 1}$

Q.2

Attempt Any Four out of Six

(16)

- (a) If $Y = e^x - \frac{1}{x} + \log_e x$ find $\frac{dy}{dx}$
- (b) If $f(x) = \frac{x+2}{4x-3}$ and $t = \frac{2+3x}{4x-1}$ show that $f(x) = x$
- (c) Determine $\frac{dy}{dx}$ if $Y = \frac{x^2+3}{x^2-2}$
- (d) Differentiate w.r.to $x : x \cdot \sin^{-1} x + \sqrt{1-x^2}$
- (e) Differentiate w.r.to $x : \log_e(\sec x + \tan x)$
- (f) Differentiate w.r.to $x : \sin^{-1}(2x \cdot \sqrt{1-x^2})$

Q.3

Attempt Any Two out of Three

(16)

- (a) If $Y = 2 \cos(\log x) + 3 \sin(\log x)$, prove that $x^2 \cdot \frac{d^2y}{dx^2} + x \cdot \frac{dy}{dx} + y = 0$
- (b) Differentiate $\tan^{-1} \left[\frac{2x}{1-x^2} \right]$ w. r. to $\cos^{-1} \left[\frac{1-x^2}{1+x^2} \right]$
- (c) If $x = \tan^{-1} \left[\frac{2t}{1-t^2} \right]$ $y = \tan^{-1} \left(\frac{3t-t^3}{1-3t^2} \right)$ find $\frac{dy}{dx}$

SECTION-II

Q.4

(18)

Attempt Any Six out of the following

- (a) If $z = 1 + 2i$ find the value of $z^2 - 2z + 6$
- (b) Find modulus and amplitude of $1 - i\sqrt{3}$
- (c) Find the gradient of the curve $y = \sqrt{x^3}$ at $x = 4$
- (d) Find the radius of curvature of the curve $y = x^3$ at $(2,8)$
- (e) Convert exponential form into Cartesian form 6.e $\frac{5\pi}{6}$
- (f) If $\vec{a} = 2\hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} - \hat{j} - \hat{k}$, $\vec{c} = 2\hat{i} - 2\hat{j} - \hat{k}$ Find $\vec{a} \cdot (\vec{b} \times \vec{c})$
- (g) Find the angle between the vectors $\hat{i} + 2\hat{j} + 2\hat{k}$ and $\hat{i} - 2\hat{j} + 2\hat{k}$
- (h) Determine the area of the parallelogram formed by the two vectors $3\hat{i} + 2\hat{j}$ and $2\hat{j} + 4\hat{k}$

Q.5

(16)

Attempt Any Four of the following

- (a) Find all value of $(1 + i\sqrt{3})^{1/3}$
- (b) Using Euler's formula prove that $\cosh^2 x - \sinh^2 x = 1$
- (c) If magnitude of force 3 units acts in the direction $2\hat{i} + 3\hat{j} + 6\hat{k}$ at the point $(1, 1, 1)$. Find moment of force about the point $(-1, 2, 3)$
- (d) Find volume of the parallelepiped of having edges vectors $\hat{i} - \hat{j} + \hat{k}$, $2\hat{j} + 3\hat{k}$, $4\hat{i} + 8\hat{k}$
- (e) Find the equation of the tangent to the curve $Y = 9x^2 - 12x + 7$ which is parallel to the x axis.
- (f) A bullet fired into block of wood penetrates according to the lane $S = 18t - t^3/6$. How far does it penetrate?

Q.6

(16)

Attempt Any Two out of Three

- (a) If $x + iy = \sin(A + iB)$ prove that
- (i) $\frac{x^2}{\cosh^2 B} + \frac{y^2}{\sinh^2 B} = 1$ (ii) $\frac{x^2}{\sin^2 A} + \frac{y^2}{\cos^2 A} = 1$
- (b) Find the maximum and minimum values of the function $Y = 2x^3 - 3x^2 - 36x + 10$
- (c) The slope of the curve $2y^3 = ax^2 + b$ at $(1, -1)$ is same as the slope of $x + y = 0$. Find a, b.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY - 2018

TIME ALLOWED: 04 HOURS

MAXIMUM MARKS: 100

COURSE: CIVIL ENGINEERING DRAWING

SEAT NO. _____

SEMESTER: II

PROGRAMME: CIVIL ENGG

CODE: 160103

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) All questions are compulsory.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered

SECTION-I

Q.1

Answer any One of following

(22)

- (a) Write down the standard requirement of a public centre (Hospital) in a town & develop and draw the line diagram with a suitable scale which will accommodate 10 beds for in patient.
- (b) Write down the standard requirement for a residential building of different rooms & develop and draw the line diagram with a suitable scale. (Assume any plan size) provide minimum 2 beds rooms.

Q.2

Answer any Three

(12)

- (a) Explain any Two of principles of planning
 - i) Aspect ii) prospect
 - iii) Orientation iv) Ventilation.
- (b) What are the standard size of papers used for drawing & explain different scales used for different drawings.
- (c) Explain the procedure of proposal for approval of building plan.
- (d) Define the terms :1) Floor space index 2) Built-up Area
 - 3) Floor area 4) plinth Area

Q.3

Answer any Two

(16)

- (a) Draw the proportionate sketch for the conventional sign of following
 - 1) Plaster 2) Coarsed rubber masonry

- 3) Folding double leaf door 4) Light plugs.
- (b) Draw the sunpath diagram & explain salient points in it.
- (c) Draw the site plan to the scale 1:100 & apply standard building bye laws for plan size 12m x 20m
- Orientation: East: 3m Road, West : Site no. 40
 North: Site No. 52, South : Site No. 56
- Also find plinth area floor area & total built-up area for FSI of 0.8.

SECTION-II

- Q.4 **Attempt any One** (20)
- (a) The fig. 1 shows line plan of house with RCC roof. Dimensions indicating all clear dimensions between the inside walls. All walls except bath & toilet are 230mm thick bath & toilet 100mm thick height of wall up to roof level 3.0mm roof slab thickness 120mm plinth level 0.45m above ground level steps rise 150mm & tread 250mm use. Following details of foundations below ground level of the main walls. Draw a plan at still level and section plan at A-A.
- (b) The Fig. 2 shows a line diagram of a restaurant with clear ninety dimensions. Draw to a suitable scale plan at the still level use all detail of walls & founds as in Q 4 a. Assume suitable size of doors window and ventilators. Assume any data if required.
- Q.5 **Attempt any One** (20)
- (a) Draw one point perspective of the object shown in Fig 3 face AB is touching PP use suitable scale & assume the position of station point.
- (b) Draw two point perspective view of object shown in fig no 4 Retain all construction ones. Take eye level at 1.50m above GL. All dimensions are in mm. Assume any data if required.
- Q.6 **Attempt any Two** (10)
- (a) List out different municipal drawing & explain the content of any 2.
- (b) Define station point, vanishing point in a perspective drawing also explain the principles of perspective drawing.
- (c) Draw elevation for the fig No 1 of question No. 4a.

Fig No. 3 For Q5a

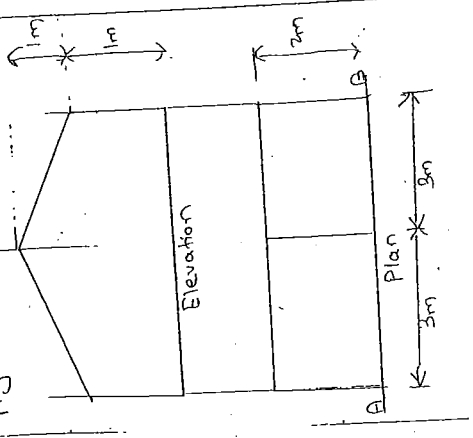
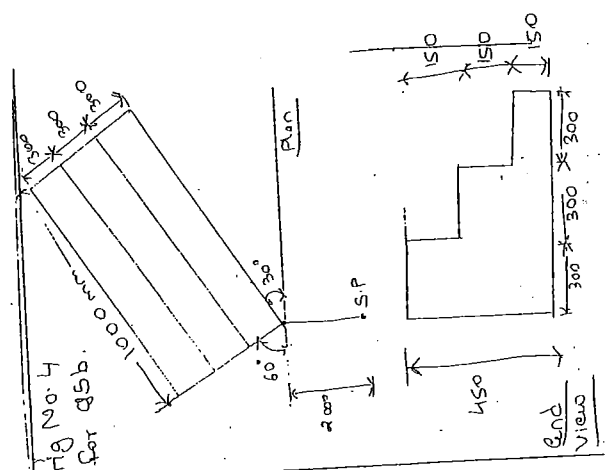


Fig No. 4 for Q5b



Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY, 2018

SEAT NO. _____
TIME ALLOWED: 03 HOURS
SEMESTER: II
MAXIMUM MARKS: 100
PROGRAMME: CIVIL ENGG.
COURSE: BUILDING MATERIALS & CONSTRUCTION SUB CODE: 160104

Instructions:

1. Answer to the two sections must be written in separate answer books.
2. All questions are compulsory.
3. Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
4. Illustrate your answer with neat sketches, wherever necessary.
5. Figure to the right indicate full marks.
6. Assume suitable additional data, if necessary.
7. The students should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION –I

- Q1. Attempt any six of the following (18)**
- a) What are the relative advantages of timber as a construction material
 - b) Write the classification of lime
 - c) What are the properties of sand as a construction material.
 - d) Write a specific use for following types of cement.
i) Portland pozzolona ii) Sulphate resisting cement
iii) White cement
 - e) List out all varieties of Mortar, write the ingredients of surkhi mortar
 - f) Define grading of concrete
 - g) What is stone pitching
 - h) Enumerate tests conducted on bricks.
- Q2. Attempt any four of the following (16)**
- a) Write a specific use of following tiles
i) Floor tiles ii) Roof tiles
iii) Tera cotta iv) Glazed tiles
 - b) What are the characteristics of good paint? Enlist at least eight
 - c) List out all types of varnishes, explain all in brief
 - d) Write uses of following in brief:-
i) Plywood
ii) Veneer
iii) Laminates
iv) Batten Board.
 - e) What is the chemical composition of cement? List all with percentages.
 - f) Differentiate Volumetric & Weigh Batching.

- Q3. Attempt any two of the following (16)**
Write short note on following
- a) Reinforced Cement Concrete
 - ii) Concrete Blocks
- b) Write a use of following paints
- i) Aluminium paint
 - ii) Cement paint
 - iii) Cellulose paint
 - iv) Oil paint
 - v) Plastic paint
 - vi) Emulsion paint
 - vii) Anticorrosive
 - viii) Bituminous paint
- c) Explain Soundness test of cement carried out in Laboratory in detail with significance & neat sketch of the same

SECTION - II

- Q4. Any Six out of Eight (Three mark each) (18)**

- a) Differentiate load bearing and framed strength
- b) Explain precaution to be taken during layout process
- c) Describe composite masonry
- d) Write Location of Doors and windows
- e) Write the location of Escalators
- f) List out all types of floors
- g) Explain defects in plastering
- h) Define scaffolding

- Q5. Any four out of six (four mark each) (16)**

- a) Classify various types of structures? Explain Load Bearing structure?
- b) Describe function and requirements of good foundation?
- c) Comparison between stone masonry and brick masonry?
- d) Enumerate different types of Doors? Explain Rolling shutters
- e) Explain Ramp and Elevators.
- f) Write a procedure of painting for a wall.

- Q6. Any two out of three (Eight marks each) (16)**

- a) What are different types of foundation? Explain shallow and Deep foundation?
- b) What are different types of windows? Explain any two in details?
- c) Describe pointing. Necessity types and procedure of pointing?

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: APPLIED MATHEMATICS

SEAT NO. _____
SEMESTER: III
PROGRAMME: CIVIL/CHEM/PLASTIC
CODE: 160013

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) All Questions are compulsory.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

Q.1

Attempt Any Six of the following :

(18)

- (a) Evaluate : $\int \frac{1}{15+4x-4x^2} dx$
- (b) Evaluate $\int \cos(\sqrt{x}). dx$
- (c) Evaluate $\int \frac{dx}{(x^2+4)(x+1)}$
- (d) Evaluate $\int_0^{\pi/4} \sin^2 x dx$
- (e) Find the area under the curve $Y=5-4x-x^2$, up to the x-axis bounded by the ordinate at $x=-1$ and $x=2$
- (f) A room has 3 lamps. From a collection of 10 bulbs of which 6 are not good, a person selects 3 bulbs at random and puts in the sockets. Find the probability that he gets light from at least one lamp.
- (g) A card is drawn at random from a well shuffled deck of cards. What is the probability that the card drawn is a spade or an ace?
- (h) A box contains 100 transistors. 20 of which are defective. 10 are selected for inspection. What is the probability that all 10 are defective?

Q.2

Attempt Any Four of the following

(16)

- (a) Evaluate $\int \frac{1}{5+4 \cos x} dx$
- (b) Evaluate $\int_0^{\pi} \frac{x \sin x}{1+\sin x} dx$
- (c) Evaluate $\int \frac{\sec^2 x dx}{\tan^2 x (1+2 \tan x)}$
- (d) Find the volume of the solid of revolution formed when the area under $y^2 = 4ax$, up to the x-axis bounded by the ordinate at $x=0$ and $x=a$ is revolved completely about the x-axis.
- (e) Find the R.M.S. value of the function $y = x^3$ as x varies from $x=0$ to $x=2$.
- (f) Five boys and two girls are to be seated at random in a row, for a photograph. Find the probability that no two girls sit together.

Q.3

(16)

Attempt Any Two of the following

- (a) Find the moment of inertia of a uniform circular disc about an axis through the centre perpendicular to its plane.
- (b) Find the centre of gravity of the area under the parabola $y = 4ax^2$ from $x = 0$ to $x = c$
- (c) If 8% of the mobiles are produced by Samsung are defective, the production of the Company are 50 mobiles per day. Find the probability that
- (i) None of the mobile is defective
- (ii) 4 mobiles are defective [Given that $e^{-4} = 0.01831$]

Q.4

(18)

Solve Any Six out of Eight

- (a) Find the first iteration by using gauss seidal method for following equation :
 $10x + y + 2z = 13$ $3x + 10y + z = 14$ $2x + 3y + 10z = 15$
- (b) Find first two real roots of equation $x^3 - 2x - 5 = 0$ using bisection method.
- (c) State order and degree of D.E.
$$\frac{[1 + (\frac{dy}{dx})^2]^{3/2}}{\frac{d^2y}{dx^2}} = r$$
- (d) Form the D.E. by eliminating the arbitrary constant for equation
 $Y = Ae^{3x} + Be^{-3x}$
- (e) Find y in terms of x if
 $\frac{dy}{dx} = 3x^2 - 2x + 5$ and $y = 5$ when $x = 2$
- (f) Solve $\frac{dy}{dx} = e^{2x-3y} + 4x^2e^{-3y}$
- (g) Check whether following D.E. is exact or not?
 $\frac{dy}{dx} + \frac{y \cos x + \sin y + y}{\sin x + x \cos y + x} = 0$
- (h) Show that $y^2 = ax^2$ is solution of $x (\frac{dy}{dx})^2 - 2y \frac{dy}{dx} + ax = 0$

Q.5

(16)

Solve Any Four of Six

- (a) Find positive root of $x^3 + x - 1 = 0$ by using Regula Falsi method upto 4 decimal places (three iteration only)
- (b) Solve by Gauss Elimination method
 $x + y + z = 4$ $y + z + 2x = 5$ $z + 3x + 2y = 7$
- (c) Solve by Jacobi's method
 $4x + y + 2z = 12$ $11y - x + 4z = 33$ $2x - 3y + 8z = 20$
(upto 3 iteration only)
- (d) Solve : $\frac{dy}{dx} = x^2 - y$
- (e) Solve : $(x + y)^2 \frac{dy}{dx} = a^2$
- (f) Form the differential equation by eliminating the arbitrary constant for equation $y = a \cos(\log x) + b \sin(\log x)$

Q.6

(16)

Solve Any Two out of Three

- (a) $x \frac{dy}{dx} + y = y^2 \log x$ solve the differential equation.
- (b) A resistance of 100Ω and inductance of 0.1 H are connected in series with 20 V supply. Find current in circuit at any instant if relation between L, R and E is given by $L \frac{di}{dt} + Ri - E = 0$
- (c) Evaluate : $\sqrt[3]{100}$ by following method
- (i) Newton - Raphson method (ii) Bisection method
[upto 4 iteration in each method]

SEAT NO. _____
SEMESTER: III
PROGRAMME: CIVIL ENGG.
CODE: 160105

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: SURVEYING

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) All questions are compulsory.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and steam tables and pocket calculator (non-programmable) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

Q.1

Attempt any six

(18)

- (a) What are the uses of surveying?
- (b) What is the use of
 - i) Ranging Rod
 - ii) Pegs
 - iii) Arrow
- (c) Define magnetic meridian & True meridian.
- (d) Define Traverse & Enlist the types of traverse.
- (e) Define Bench mark. Enlist the types of Bench mark.
- (f) What are the uses of contouring (any three)
- (g) Describe cross staff.
- (h) Enlist the component parts of planimeter and give function of any three of them.

Q.2

Attempt any four

(16)

- (a) Convert the following WCB into RBS
 - i) WCB of AB = $45^{\circ}30' 00''$
 - ii) WCB of BC = $145^{\circ}30' 00''$
 - iii) WCB of CD = $245^{\circ}30' 00''$
 - iv) WCB of DE = $345^{\circ}30' 00''$
- (b) Draw the conventional symbols used in chain surveying.
 - i) North line
 - ii) Chain line
 - iii) Single Railway line
 - iv) Electric line
- (c) How the magnetic bearing are designated. Explain any one in detail.
- (d) Define
 - i) Line of collimation
 - ii) Axis of Telescope
 - iii) Axis of Bubble tube
 - iv) Levelling
- (e) Enlist component parts of dumpy level. Give use of any four of them.
- (f) State the uses of levelling.

Attempt any two of the following.

- (a) Define permanent adjustment of level, state various fundamental lines of level also give relationship between fundamental lines.
- (b) The following Consecutive readings were taken with a dumpy level along a chain line at intervals of 20m. The chainage of the first reading is 140m and the RL of first reading is 240m. The instrument was shifted after fourth & ninth reading.
3.250, 2.345, 1.225, 0.960, 3.225, 2.860, 1.935, 1.570, 2.065, 1.325, 2.490 & 3.135

Calculate the RL of all readings also calculate gradient between first and last reading.

- (c) Following are the observed bearings of lines of traverse ABCDE With a compass in place where local attraction was suspected.

Line	FB	BB
AB	191°45'	13°0'
BC	39°30'	222°30'
CD	22°15'	200°30'
DE	242°45'	62°45'
EA	330°15'	147°45'

Find the corrected bearings of lines.

SECTION-II

Q.4

Attempt any six

(a) Define the following.

- i) Swinging the telescope
- ii) Transiting
- iii) Telescope normal

(b) What are the uses of theodolite?

(c) Define traverse & Enlist the types of traverse with sketch.

(d) What is balancing of Torques?

(e) Define tachometric surveying? State the instruments used in tachometry.

(f) What are the advantages of plane table surveying?

(g) Define curve? Enlist the various types of curve?

(h) What are the characteristics of tachometer?

(18)

Q.5

Attempt any four

(a) Describe the principle of tachometry with neat sketch?

(b) What are the methods of plane tabling? Describe any one of them with sketch.

(c) Write down the checks applied in closed traverse?

(d) Explain the deflection angle method of theodolite traversing.

(e) Write down the characteristics of tachometer.

(f) Note on

What is parallax? How it can be removed?

(16)

Q.6

Attempt any two

(a) Explain determination of tachometric constant in detail.

(b) What are the properties of simple circular curve (with Sketch)

(c) Explain procedure for measuring horizontal angle by method of repetition.

(16)

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL / MAY 2018

TIME ALLOWED: 03 HOURS SEAT NO. _____
MAXIMUM MARKS: 100 SEMESTER: III
COURSE: TRANSPORTATION ENGG-I PROGRAMME: CIVIL ENGG.
CODE: 160107

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) All questions are compulsory.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

- Q.1. Attempt any six. (18)**
- (a) Explain functions of permanent way.
 - (b) Explain various fastenings required for sleepers.
 - (c) Draw a neat diagram of fish plate.
 - (d) Explain Anti-creeper.
 - (e) Explain various types of stations.
 - (f) Explain crossings.
 - (g) Draw neat sketch of diamond crossing and name the components.
 - (h) Define sleepers and enlist types of sleepers.
- Q.2. Attempt any Four. (16)**
- (a) State requirement of an ideal permanent way.
 - (b) Differentiate between goods yards and marshalling yards.
 - (c) Write short note on mono rails.
 - (d) Describe spikes and rail anchors.
 - (e) Describe bearing plate with fastener.
 - (f) Explain essential requirements of ballast.
- Q.3. Attempt any Two. (16)**
- (a) Discuss the factors affecting the adoption of particular gauge.
 - (b) Write a note on-
 - (i) Ladder track
 - (ii) gauntlet track
 - (c) Explain sleepers in detail.

SECTION-II

Q.4. Attempt any 6 out of the following **(18)**

- (a) What is the role of transportation in the development of nation?
- (b) Define gradient camber.
- (c) Draw a neat sketch of surface drain.
- (d) What is the function of –
 - (i) Sight distance
 - (ii) Bearings in bridges
- (e) What are the defects due to improper highway drainage?
- (f) Define- afflux, Economic span, Freeboard.
- (g) Draw a neat sketch of Slab Culvert.
- (h) What are the advantages of superelevation?

Q.5. Attempt any 4 of the following. **(16)**

- (a) What are the different tests carried out for Bituminous aggregates, explain any two of them.
- (b) What are requirement of good drainage system.
- (c) Draw a neat sketch of Lift Bridge.
- (d) How prestressed concrete sleepers are advantageous than any other any other type of sleepers.
- (e) Differentiate between permanent and temporary bridges.
- (f) What are the different joints in cement concrete road draw any two of them.

Q.6. Attempt any two of the following. **(16)**

- (a) Write a detailed note on maintenance of bridges.
- (b) (i) Draw a neat cross section of Bridge show all components.
(ii) What are the factors affecting alignment of bridge.
- (c) Write a detailed construction procedure of cement concrete road.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY-2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: CONCRETE TECHNOLOGY

SEAT NO. _____
SEMESTER: III
PROGRAMME: CIVIL ENGG
CODE: 160108

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt **ALL** questions from Section-I and Section-II.
- (3) All questions are compulsory.
- (4) Illustrate your answers with neat sketches, wherever necessary.
- (5) Use of Mathematical and Steam tables and pocket calculator (non-prog.) is permissible.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.

SECTION-I

Q.1 Any Six out of Eight (18)

- (a) Explain Portland slag cement?
- (b) Explain Quality of water for use in concrete?
- (c) Describe factors affecting workability.
- (d) Describe curing of concrete.
- (e) Write a note on Rebound Hammer Test.
- (f) Write a note on ultra sonic pulse velocity test.
- (g) Describe ultra high strength concrete.
- (h) Describe high strength concrete.

Q.2 Any four out of Six (16)

- (a) Describe soundness test of cement.
- (b) Explain importance of grading of aggregates.
- (c) Explain slump test.
- (d) Write a note on RMC.
- (e) Explain W/C ratio in mix design.
- (f) Write a note on finishing of concrete.

Q.3 Any Two out of Three (16)

- (a) Enlist different types of cement. Explain OPC and PPC cement.
- (b) Describe manufacturing process of concrete.
- (c) Explain Admixtures in details.

SECTION-II

Q.4

Answer Any Six of following

(18)

- (a) Define the term durability as mentioned in IS 456-2000.
- (b) Define the term nominal mix. What is the highest grade of concrete, which can be made by nominal mix as recommended by IS 456:2000
- (c) What are the measures of good concrete?
- (d) List the processes involved in manufacturing of concrete.
- (e) Why is the compaction of concrete necessary?
- (f) Define the term bleeding.
- (g) What are the precautions to be taken to control the temperature of concrete?
- (h) What are the different types of slumps? Draw the figures.

Q.5

Answer Any Four of following

(16)

- (a) Write the advantages of machine mixing over hand mixing of concrete.
- (b) Define the term water/ cement ratio and total water/ cement ratio.
- (c) Write the necessity of currying of concrete.
- (d) What are the circumstances when it is required to use super plasticizer in making the concrete?
- (e) With the help of neat sketch explain the functioning super plasticizers.
- (f) Draw the graph showing the relation between % of voids presents in concrete and compressive strength of concrete.

Q.6

Answer Any Two of following

(16)

- (a) Write the properties of good form work. Draw a neat sketch of formwork for RCC retaining wall.
- (b) What are general principles and considerations in concrete mix design? Write a short note on IS method of concrete mix design.
- (c) What are two machines and equipments used in execution of concrete? What are the different methods of compacting the concrete? Draw a neat sketch showing the sequence of concrete compaction using poker (needle) vibrator.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY- 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: MATERIAL & STRUCTURE

SEAT NO. _____
SEMESTER: III
PROGRAMME: CIVIL ENGG.
CODE: 160109

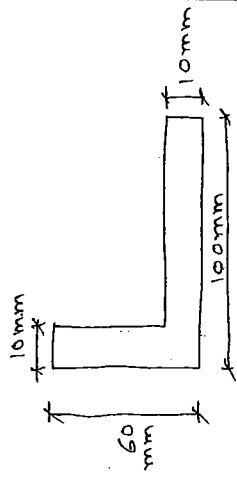
INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt **all** questions.
- (3) All Questions are compulsory.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Illustrate your answers with neat sketches, wherever necessary.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.
- (8) The student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION - I

- Q.1** Attempt any Six of the following (18)
- (a) Define Resilience, Proof Resilience and modulus of Resilience.
 - (b) State and explain perpendicular axis theorem.
 - (c) A steel rod 20mm in diameter is 1000mm long. It is subjected to axial pull of 30KN. If the elongation observed is 0.4mm, Calculate the modulus of elasticity.
 - (d) Define shear stress, complementary shear stress and modulus of rigidity.
 - (e) State equations of major and minor principle stresses for complex stress system giving meaning of each term used in it.
 - (f) Write the equations for instantaneous stress developed due to i) Gradual load ii) Sudden load & iii) Impact load. Giving meaning of each term used in it
 - (g) An alloy has bulk modulus as 150GPa and Poisson's ratio as 0.3, determine modulus of rigidity and modulus of elasticity.
 - (h) A rod of 16mm diameter is subjected to a pull of 20KN. If length is 800mm, change in diameter is 0.002mm and modulus of elasticity is $2 \times 10^5 \text{N/mm}^2$, determine change in length and Poisson's ratio.

- Q.2** Attempt Any Four (16)
- (a) At a point in a strained material the normal tensile stresses are 60N/mm^2 and 30N/mm^2 on two perpendicular planes respectively. Determine by Mohr's circle, the resultant intensities of stress on a plane inclined at 40° to the axis of the minor stress.
 - (b) Determine moment of inertia about centroid XX and YY axis of given angle section



- (c) A steel rod is 2000mm long. It has a collar at its lower end and upper end is fixed in ceiling. A load of 200N is dropped onto the collar from a height of 60mm. Determine the maximum instantaneous stress developed in the rod and change in length of rod due to impact load

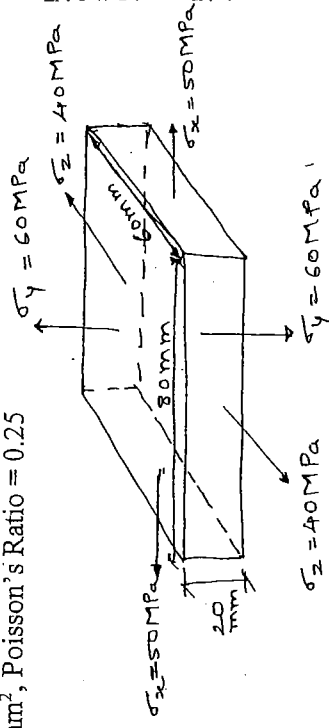
- (d) Two wires one of steel and other of copper are of the same length and are subjected to the same tension. If the diameter of the copper wire is 2mm, determine the diameter of the steel wire, if they are elongated by same amount. Take $E_{STEEL} = 200 \text{ GPa}$ & $E_{COPPER} = 100 \text{ GPa}$
- (e) Derive the relation between Young's Modulus and shear Modulus.
- (f) A body of cross sectional area 100 m^2 and length 105 mm is subjected to a load of 8 kN . Determine stress induced if
- Load is applied gradually
 - Load is applied suddenly
- Also determine change in length in both cases. Take $E = 210 \text{ GPa}$

Q.3

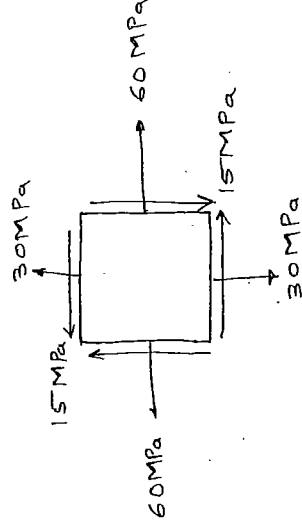
Attempt Any Two

(16)

- (a) A composite member of overall cross-section dimensions $50 \text{ mm} \times 30 \text{ mm}$ is made up of steel and bronze plated of size $50 \text{ mm} \times 15 \text{ mm}$ and connected together to act as one unit. A composite member while testing under UTM shows a compression of 0.014 mm in a length of 200 mm . Determine the load acting on a composite member and that shared by each material
 Take $E_{STEEL} = 200 \text{ kN/mm}^2$
 $E_{BRASS} = 80 \text{ kN/mm}^2$
- (b) Determine the change in dimension of block shown below
 Take $E = 2 \times 10^5 \text{ N/mm}^2$, Poisson's Ratio = 0.25



- (c) For shown strained element, calculate principal stresses along with its planes and maximum and minimum shear stresses along with its planes.



SECTION-II

Q.4

Attempt any Six of the following

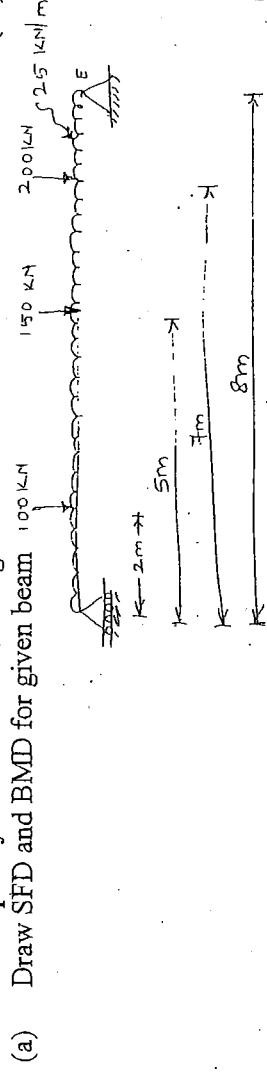
(18)

- Write the assumptions made in bending theory.
- Draw the shear stress distribution diagram for standard rectangular section, T-section and I-section (Symmetric).
- Write the assumption made in torsional theory.
- Explain bending stresses in flitched beam.
- A hollow shaft of external and internal dia. of 80 mm and 50 mm is required to transmit torque from one end to the other. What is the safe torque it can transmit, if the allowable shear stress is 45 MPa ?
- Define the term limit of eccentricity. Also write the values for rectangular and hollow circular section?
- Explain the concept of Bending or pure Bending.
- Explain the importance of shear force and bending moment diagram.

Q.5

Attempt any Four of the following.

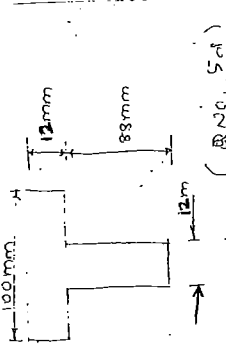
(16)



(b) A solid shaft of 120mm diameter is required to transmit 200KW at 100rpm. If the angle of twist not to exceed 2° , find the length of the shaft. Take modulus of rigidity for the shaft material as 90GPa.

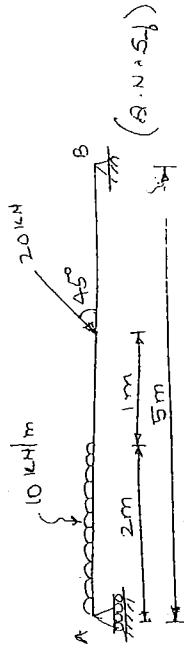
(c) A short column 200mm x 100mm is subjected to an eccentric load of 60 kN at an eccentricity of 40mm in the plane bisecting the 100mm side. Find maximum and minimum intensities of stresses at the base.

(d) Fig. Shows the cross section of a beam which is subjected to a shear force of 20 KW. Calculate & Draw shear stress distribution across the depth marking value at salient point.



(e) A fitted beam consists of wooden joist 10cm wide and 20cm deep strengthened by two steel plates 10mm thick & 20cm deep. If the maximum stress in wooden joist is 7N/mm^2 , find the corresponding maximum stress attained in steel. Find also the moment of resistance of composite section. Take young's modulus for steel = $2 \times 10^5 \text{ N/mm}^2$ and for wood = $1 \times 10^4 \text{ N/mm}^2$.

(f) A simply supported beam 5m long is loaded as shown in fig. below. Calculated & draw SF & BM alignment.

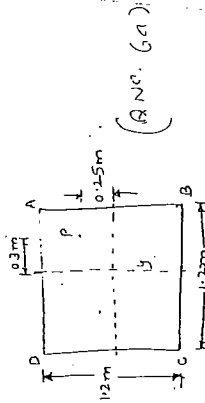


Q.6

Attempt any Two of the following

(18)

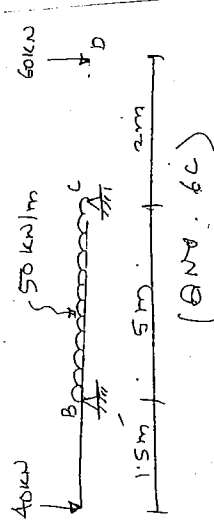
(a) A column 1.2m x 1.2m is subjected to an eccentric load 600KW as shown in fig. Find the stresses at the corner A, B, C and D. Draw stress distribution diagram.



(b) The cross section of the beam is a rectangle 60mm x 80mm deep. The max shear stress in the section is 45MPa. Calculate shear stress at a section

i) 40mm above NA ii) 20mm below NA

(c) A beam 8.5m long rest on support 5m apart the beam carries the load as shown in fig. Draw the S.F. & B.M. diagram and state the all-important point industry points of contra flexure

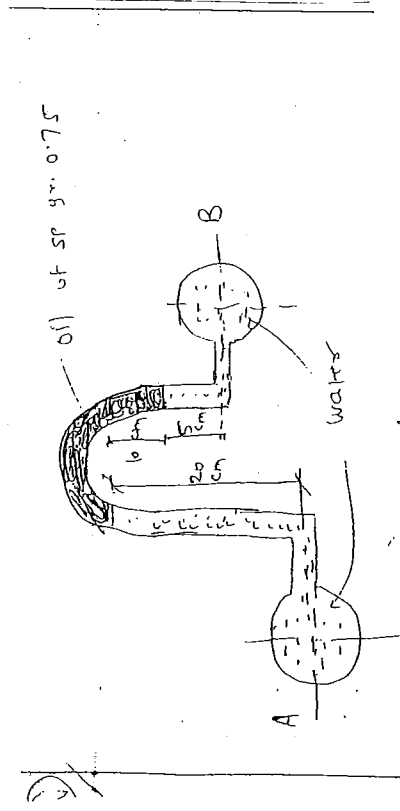




Q.3

Attempt ANY TWO of the following.

(16)



- An inverted differential manometer having an oil of specific gravity 0.75 was connected to two different pipes carrying water under pressure as shown in the above fig. Determine the pressure in the pipe B in terms of head of water & Kg/cm^2 . Take pressure in pipe 'A' 1.5m of water.
- Explain the stepwise procedure of determination of Bernoulli's theorem in laboratory.
- A cubical tank has sides of 1.5m. It contains water for the lower 0.6m depth. The upper remaining part is filled with oil of sp. gravity 0.9m. Calculate for one vertical side of the tank.
(a) total pressure (b) position of centre of pressure

7/3

160113

SECTION-II

Q.4

Attempt ANY SIX

(18)

- a) Explain the classification of orifices.
- b) Differentiate between internal and external mouth pieces.
- c) Define a notch and a weir.
- d) Explain the classification of weirs.
- e) State major and minor losses in a pipe carrying a fluid.
- f) Find the diameter of a pipe of length 2000m. When the rate of flow of water through the pipe is 200 litres/sec and the head lost due to friction is 4m. Take the value of C is 50.
- g) Define a pump. State any two uses of a pump.
- h) Define any three head in relation with a centrifugal pump.

Q.5

Attempt ANY FOUR

(16)

- a) **The head of water over the centre of an orifice of diameter 20mm is 1m. The actual discharge through the orifice is 0.85 litres/sec. Find the coefficient of discharge.**

- b) A jet of water issuing from a sharp edged vertical orifice under a constant head of 10cm at a certain point has horizontal and vertical co-ordinates measured from vena-contracta as 20.0cm and 10.5cm respectively. Find the value of C_v . Also find the value of C_c if $C_d = 0.60$.

- c) State the advantages of a triangular notch over a rectangular notch.

- d) Water flows through a triangular right angled weir first and then over a rectangular weir of 1m width. The discharge coefficients of triangular and rectangular weirs are 0.6 and 0.7 respectively. If the depth of water over the triangular weir is 360mm, find the depth of water over the rectangular weir.

- e) Define water hammer. State any three causes for it.

- f) Differentiate between centrifugal and reciprocating pump.

Q.6

Attempt ANY TWO

(16)

- a) **Explain with a sketch, main parts of a centrifugal pump and its working also explain priming of a centrifugal pump.**

- b) A convergent divergent mouth piece having throat diameter of 4.0cm is discharging water under a constant head of 2.0m. Determine the maximum outer diameter for maximum discharge. Find maximum discharge also. Take $H_a = 10.3$ m of water and $H_{sep} = 2.5$ m of water absolute.

- c) At a sudden enlargement of a water main from 240mm to 480mm diameter, the hydraulic gradient rises by 10mm. Estimate the rate of flow.

3/3

160113



Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL / MAY 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: ENVIRONMENTAL ENGG.

SEAT NO. _____
SEMESTER: IV
PROGRAMME: CIVIL ENGG.
CODE: 160112

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) All questions are compulsory.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and steam tables and pocket calculator (non-programmable) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

Q.1

Attempt any six

- (a) State the necessity of planned water supply scheme.
 - (b) List out all methods of population forecasting.
 - (c) Differentiate Dry intake tower and wet intake tower.
 - (d) How total solids and suspended solids can be determined.
 - (e) Differentiate between plain sedimentation and sedimentation aided with coagulation.
 - (f) What is desalination process?
 - (g) Draw a neat sketch of gravitational system of distribution of water.
 - (h) State all methods of removal of hardness.
- (18)**

Q.2

Attempt any four

- (a) State and explain any four factors affecting per capita demand.
 - (b) State all physical characteristics of Raw water and explain any one.
 - (c) Draw a neat sketch of rectangular sedimentation tank.
 - (d) State various layouts of distribution network, explain any one of them.
 - (e) State the requirements of good distribution system.
 - (f) Explain the term, "Break point Chlorination"
- (16)**

Q.3

Attempt any two

- (a) Population of a town as obtained from the census report as follows.

Year	1941	1951	1961	1971
Population (thousands)	242	485	770	1090

Estimate the population of the town in the year 1981, 1991 and 2001 by Arithmetic increase method.

- (b) Explain the operational troubles in rapid sand filter. How it can be overcome?
- (c) Differentiate between slow sand filter and Rapid sand filter.

SECTION-II

- Q.4** **Attempt any Six** **(18)**
- (a) Discuss in brief various components of sewerage system.
 - (b) Discuss in detail suitability and limitations of any three shapes of sewers.
 - (c) Discuss in detail with neat sketch different types of manholes.
 - (d) Discuss in detail Requirements of good traps.
 - (e) Discuss in detail chlorination of sewage (function, significances, problems)
 - (f) Discuss in brief with a flow sheet stages in sludge Digestion process.

- Q.5** **Attempt any Four** **(16)**
- (a) Differentiate between one pipe and two pipe system. Also discuss in brief partially ventilated plumbing system.
 - (b) Discuss in detail the following with neat sketch
 - 1) Drop manholes and flushing tanks.
 - (c) Discuss in detail causes of sewage sickness.
 - (d) Discuss in detail conditions favouring disposal of sewage effluents by dilution method.
 - (e) Discuss in detail screening provided for sewage treatment with neat sketch.
 - (f) Enlist the various Bacteriological Tests conducted on sewage. Also discuss step-by-step procedure of any one Test.

- Q.6** **Attempt any Two** **(16)**
- (a) Differentiate between Activated sludge process and Trickling filters in detail.
 - (b) Discuss in detail laying and testing of sewers with neat sketches.
 - (c) Discuss in detail advantages and disadvantages of water carriage system and water conservancy system.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY, 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: Quantity Survey, Estimation & Valuation CODE: 160114
SEAT NO. _____
SEMESTER: IV
PROGRAMME: CIVIL ENGG.

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt ALL questions from Section I & Section II.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

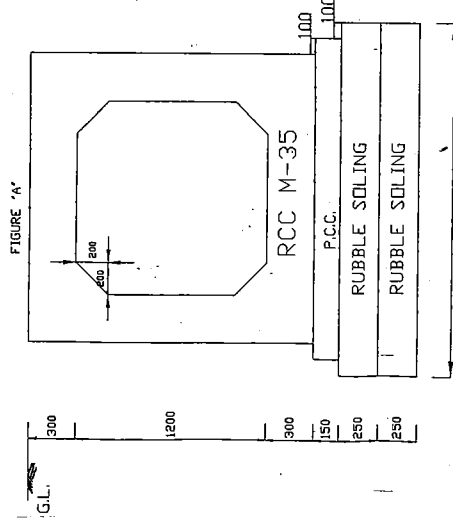
SECTION-I

Q.1 Attempt ANY SIX (Three marks each) (18)

- a) State the necessity of Approximate Estimate.
- b) State any four methods by which the approximate cost of the building can be found out.
- c) Differentiate between administrative approval and technical sanction.
- d) Differentiate between revised estimate and supplementary estimate.
- e) Discuss the term bar bending schedule.
- f) State the unit of measurement for :
 - i) Steel Reinforcement
 - ii) Half brick thick wall
 - iii) Flooring
 - iv) Formwork
- g) State the rules for deduction of openings as per IS 1200 for plastering.
- h) Dense Bituminous Macadam (D.B.M.) having density 23KN/m^3 (2.3T/m^3) having bitumen content 5% of total weight to be laid for roadwork. Find the quantity of Bitumen required for 1m^3 of D.B.M., in kg.

Q.2 Refer Fig No. "A". Typical cross section of storm water drain. Calculate the quantities of items of drain of any four (4) items detail below. Calculate for 100m. in length Drain. [Fig. No. A is attached to this paper]. (16)

- a) Excavation in murrey
- b) Rubble soling
- c) P.C.C.
- d) Concrete M35 for Drain section
- e) Shuttering for drain wall
- f) Shuttering for Drain slab



TYPICAL SECTION
FOR RCC COVERED DRAIN
NOTE: ALL DIMENSIONS ARE IN MM.

Q.3

Attempt ANY TWO (Eight Marks each)

(16)

- a) Calculate the quantity of earthwork for a portion of road from the following data, R.L. for formation is 107. Formation width of road is 10m and side slopes 2:1 in cutting and embankment. Upward gradient is 1 in 100.

Chainage	R.L.of Ground
0	107.50
50	108.00
100	108.50
150	109.30
200	109.00
250	108.70
300	108.30
350	108.00

- b) A R.C.C. beam 300mm wide and 450mm dap and length 5000mm. is reinforced with 4 Nos. of 12mm dia. bar placed at bottom in one row, out of 4 bars, 2 bars are straight and 2 bars, are bent up respectively. In addition to this, 2 anchor bars of 10mm dia. are provided at top. 6mm dia. stirrups are provided at top. 6mm dia. stirrups are provided at 150 mm c/c. Overall cover provided to the beam is 25mm.
Calculate the total quantity of steel and also prepare bar bending schedule.

- c) Workout the quantities of concrete and steel required for a R.C.C. lintel beam 1.2m. Clear span and size 230 x 230mm. Bearing in the wall is 150mm on either side. Steel provided are 2 nos. 10mm dia. at bottom and 2 Nos. 8mm dia at top with 6mm dia ring @ 200 mm c/c.

SECTION-II

Q.4

Attempt ANY SIX of the following.

(18)

- a) Enlist any six values.
b) Define sinking fund. State any two factor affecting sinking fund.
c) Define task work. State any two factors affecting it.
d) Explain what do you mean by job overhead and general overheads.
e) Estimate quantity of cement, sand and aggregate for P.C.C. of room six 6m x 4m with P.C.C. 20cm thick in cement concrete 1:2:4.
f) Define specification. Mention any two uses.
g) State any three purposes of rate analysis.
h) State any three purposes of valuation.

Q.5

Attempt ANY FOUR of the following.

(16)

- a) Explain any four types of value.
b) Differentiate between depreciation and obsolescence.
c) Explain any four factors affecting rate analysis.
d) Explain any four principles for writing specifications.
e) Explain any two types of specification.
f) Explain what do you mean by a measurement sheet. Draw format for the same.

Q.6

Attempt ANY TWO of the following.

(16)

- a) Draft detailed specification for excavation.
b) Prepare rate analysis for a internal plaster with C.M 1:6 for a hall measuring 5m x 8m, floor to floor height is 3m.
c) Prepare rate analysis for brunt brick masonry in C.M. (1:6) for superstructure.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY-2018

TIME ALLOWED: 03 HOURS

MAXIMUM MARKS: 100

COURSE: MECHANICS OF STRUCTURE

SEAT NO. _____

SEMESTER: IV

PROGRAMME: CIVIL ENGG

CODE: 160115

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt **ALL** questions from Section-I and Section-II.
- (3) All questions are compulsory.
- (4) Illustrate your answers with neat sketches, wherever necessary.
- (5) Use of Mathematical and Steam tables and pocket calculator (non-prog.) is permissible.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.

SECTION-I

Q.1 Attempt any six of the following. (18)

- (a) Write Mohr's 1st statement of moment area.
- (b) Write assumption made in Euler's theory of long column.
- (c) A beam of 6m span is simply supported at the end and it carries udl of 10kN/m. Calculate max deflection. Take $E = 2 \times 10^5 \text{ N/mm}^2$, $E = 1880 \times 10^4 \text{ mm}^4$.
- (d) Define effective length of column. Write Euler's formula if a column of length 'l' has one end fixed end other hinged.
- (e) An angle section has $I_{xx} = 27.4 \times 10^4 \text{ mm}^4$, $I_{yy} = 6.8 \times 10^4 \text{ mm}^4$. If effective length is 2.0 m and angle is used as a strut, calculate safe compression force, Take $E = 2 \times 10^5 \text{ N/mm}^2$.
- (f) Write no tension condition is case of a dam section.
- (g) A dam retains water on its vertical face up to 9m height. Calculate horizontal water pressure and overturning moment M_o acting on dam.
- (h) A cantilever beam carries a point load at its end. Calculate slope at free end.

Q.2 Answer any Four of following (16)

- (a) A simply supported beam of span 45m carries a point load at 1.5m from its left end, using moment area method calculate deflection under the point load.
- (b) A hollow tube of outer diameter 120mm and inner diameter 80mm is used as a column. If length of tube is 2500mm with both ends hinged, calculate safe load on column. Take $E = 2 \times 10^5 \text{ N/mm}^2$.
- (c) Write the limitation of Euler's formula and show that for a steel column if slenderness ratio is less than 80, Euler's formula is not valid
Take $\sigma_c = 330 \text{ N/mm}^2$, $E = 2.1 \times 10^5 \text{ N/mm}^2$
- (d) Define the term slenderness ratio. A column has length of 4.0m with one end fixed and other hinged $I_x = I_y = 106500 \text{ mm}^4$ Area $A = 766 \text{ mm}^2$, Calculate slenderness ratio.

1/4

160115

- (e) Write the procedure to calculate eccentricity of resultant 'R' of total horizontal water pressure and weight of a masonry dam (W), Water face is vertical and dam is trapezoidal in section
- (f) Write the condition of stability of a dam.

Q.3

Answer any Two of following

- (a) Calculate forces in members 1,2,3,4,5 and 11

Refer fig (1)

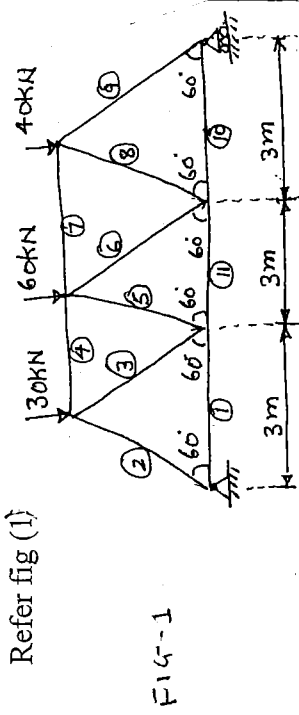


FIG-1

- (b) Fig (2) shows a simply supported beam calculate slope at A and deflection at C. Take $E = 2 \times 10^5 \text{ N/mm}^2$, $I = 1660 \times 10^4 \text{ mm}^4$

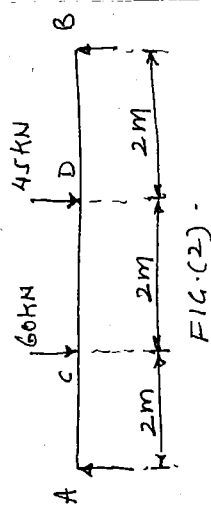


FIG.(2)

- (c) A trapezoidal masonry retaining wall 1m wide at top, 3m wide at its bottom, is 8.0m high. It is retaining earth having level top on its vertical face, check the stability of retaining wall. Take unit wt of masonry = 24 KN/m^3 , unit weight of soil = 18 KN/m^3 , $\phi = 30^\circ$, $\mu = 0.60$, $\sigma_c = 400 \text{ KN/m}^2$

SECTION-II

Q.4

Answer any Six of the following

- (a) Write advantages of fixed beam over simply supported beam.
- (b) Show that fixed end moment for a centrally point loaded beam is $\left(\frac{WL}{8}\right)$
- (c) Define carry over factor stiffness factor and distribution factors.
- (d) Write Clapeyron's 3 moment equation and write meaning of abbreviations used with the help of a neat sketch.
- (e) Find distribution factor for 2- span continuous beam AB - BC span AB = BC = l. $I_{AB} = I_{BC}$ = I end A is fixed while C is simple support
- (f) Define plastic modulus and shape factor.
- (g) A fixed beam of span 6m carries a point load of 60kN at 3m from left support calculate fixed end moment draw BMD.
- (h) A continuous beam AB - BC has ends A and C as hinged spans AB = BC = 5m. Beam carries a UDL on 30 kN/m over both the spans. Write three moment equation and calculate support moments.

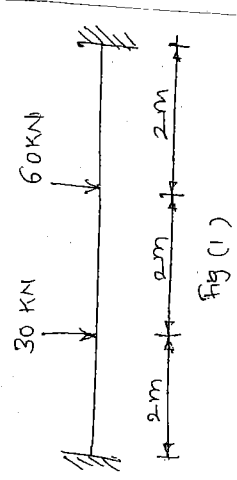
(18)

Q.5

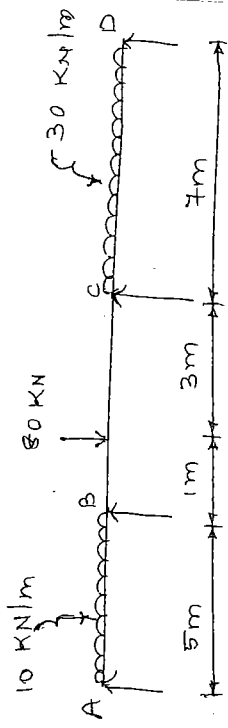
Answer any Four of the following

(16)

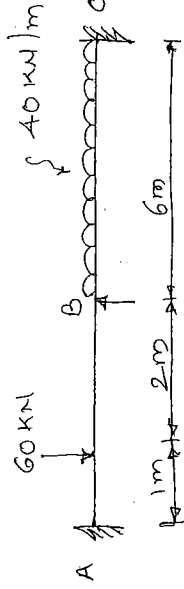
- (a) Draw BMD for the beam shown in fig (1)



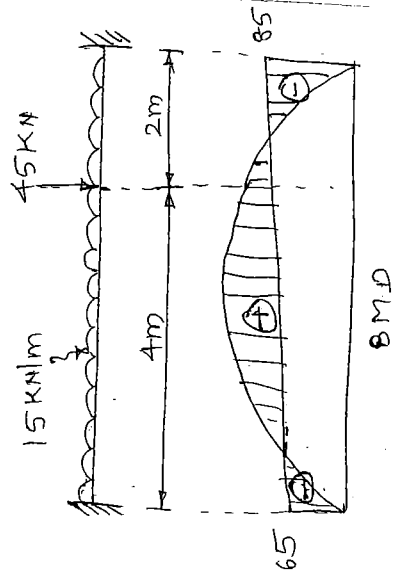
- (b) Fig (2) shows a continuous beam calculate support moment by 3 moment equation method.



- (c) Fig (3) shows a continuous beam. Calculate support moment by moment distribution method.



- (d) Calculate plastic modulus and shape factor for rectangular section
 (e) A tea beam has flange of 80mm x 10mm and web of 100mm x 10mm. Calculate shape factor.
 (f) Fig (4) shows BMD for a fixed beam Calculate net direction and draw SFD.



Q.6

Answer any Two of the following

(16)

(a) Fig (5) shows a fixed beam. Draw BMD and SFD.

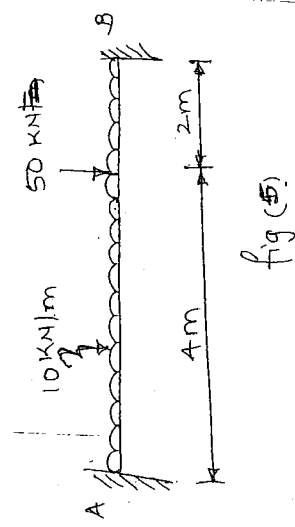
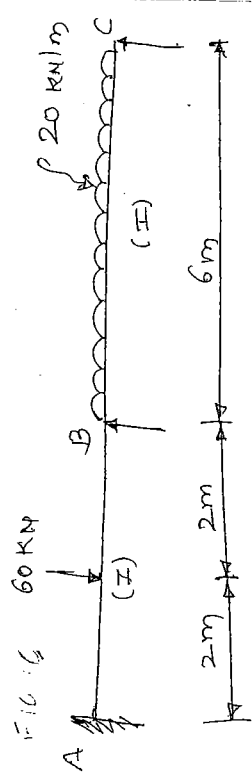


fig (5)

(b) Calculate plastic modulus and shape factor for a circular section.

(c) Fig(6) shows a continuous beam. Draw BMD for full beam and SFD for span AB only. Solve by any method.



Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY -2018.

SEAT NO. _____
SEMESTER: IV
PROGRAMME: CIVIL ENGG

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100

COURSE: DESIGN PRACTICE OF STEEL STRUCTURE CODE: 160116

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) All questions are compulsory.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of pocket calculator (non-programmable) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.
- (8) Use of IS800: 2007 and std. steel tables permitted.

SECTION-I

Q.1

Attempt Any Six

(18)

- (a) Determine load combination for design purposes.
- (b) Define term : (i) pitch of bolts (ii) Gauge distance
- (c) State classification of bolts.
- (d) Draw a sketch for (i) Tee fillet weld (ii) Corner butt weld.
- (e) State any three advantages of welded joints.
- (f) Sketch (i) Double angles (ii) I-Sections.
- (g) Define net sectional area.
- (h) State factors used for determine the effective net area.

Q.2

Attempt Any Four

(16)

- (a) Write comparison between working stress and limit state method (any 4 points of each)
- (b) Determine the bolt value of 20 mm dia. bolt connecting 10 mm plate in (i) Single shear (ii) Double shear. Bolts used are 4.6 grade, plate of 410 grade. Take area of bolt as 245 mm².
- (c) Explain with neat sketch (i) Double bolted lap joint.
- (d) State types of failure of bolted joints and explain any one.
- (e) Determine the effective net area for the section of ISA100x75 x10mm The angles are connected 3, 18 mm bolts of grade 4.6. The steels is of grade Fe 410.
- (f) Define terms: (i) Slenderness ratio (ii) Displacement

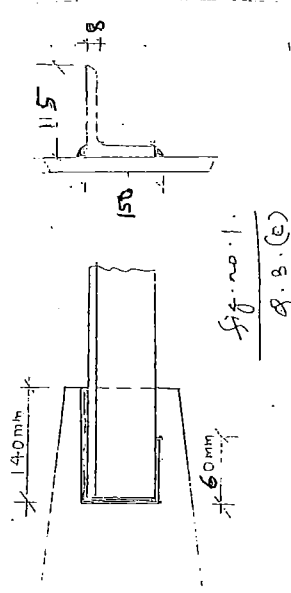
Q.3

Attempt Any Two

(16)

- (a) Calculate the strength of a 20 mm dia. bolt of grade 4.6 for the following cases. The main plates to be jointed are 12 mm thick. (a) Lap joint (b) Single cover butt joint, the cover plate being 10 mm thick

- (b) A tension member consist of 2 ISA 90 x 90 x 8 mm connected back to back with 10 mm gusset plate by 20 mm dia. bolts. Tacking bolts are provided. Calculate design tensile load in any one of the following case if they are placed on
- Both sides of gusset plate
 - Same side of gusset plate
- Consider $A_{ub} = 245 \text{ mm}^2$
- (c) Compute the tensile strength of an angle section ISA 150 x 115 x 8 mm of Fe 410 grade connected with the gusset plate as shown in fig. no.1 for the following cases: (a) gross section yielding (b) net section rupture.



SECTION-II

- Q.4 **Answer Any Six out of Eight** (18)
- State and sketch the four end conditions of column showing their effective length.
 - State the function of laving and battening.
 - State the design steps of rolled steel beam when it is laterally restrained.
 - How beam section are classified for bending as per IS 800:2007. Describe any two of them?
 - Draw plan, elevation and side view of a gusseted base, showing all components.
 - Write the difference between slab base and gusseted base.
 - Draw a neat sketch of roof truss showing component parts.
 - Design steel roof truss and write any three advantages of using steel roof truss.
- Q.5 **Answer Any Four out of Six** (16)
- Determine the design flexure strength of a laterally supported beam ISMB 350 @ 514 N/m. Assume that the factored shear force is less than then design shear strength steel grade is Fe 410.
 - A single angle ISA 90 x 90 x 8 mm is used as a strut in a roof truss. The c/c distance between intersection points at each end is 2.75 m. Determine the design strength of the strut for the case at each end of connection, two bolts are provided.
 - A column ISMB 350 carries an axial load of 1250 KN. Design a slab base and concrete pedestal for the column. The SBC of the soil is 180 KN/m² and M20 grade concrete is used for concrete pedestal.
 - Draw neat sketches of bolted connections in case of :
 - Beam to Beam connection when flanges are at same level
 - Beam to column connection

(e) Check suitability of angle purlin ISA 100 x 75 x 8 mm with following details:

(i) Dead load = 1.2 KW/m

(ii) Live Load = 0.75 KW/m

(iii) Wind Load = 2.0 KW/m

(iv) Spacing of trusses = 4 m c/c

(f) A built up column, consisting of 2 ISMC- 225 placed back to back at 140 mm. The length of column is 8 m and is effectively held in position and restrained against rotation at both ends. Find the design strength of column. For ISMC; $A = 3301 \text{ mm}^2$, $I_{xx} = 26.946 \times 10^6 \text{ mm}^4$, $I_{yy} = 1.872 \times 10^6 \text{ mm}^4$, $C_{yy} = 23.1 \text{ mm}$

Q.6

Answer Any Two out of Three

(16)

(a) Design the column section to carry an axial service load of 700 KN (including self-weight) the column is 5m long with effectively held in position at both ends and restrained against rotation at one end. Refer Table 2 below for various section of ISHB. Also refer Table 1 for the values of compressive stresses

Table 1 Design compressive stress for buckling curve 'c'

Sr. No.	10	20	30	40	50	60	70	80	90	100	110	120
Fed	227	224	211	198	183	168	152	136	121	107	94.6	83.7

Table 2 Properties of ISHB

Section	Depth (h) mm	Breadth h of flange	Area (mm ²)	t _f (mm)	I _{xx} (mm)	I _{yy} (mm)
ISHB-250	250	250	6496	9.7	109.1	54.9
ISHB-300	300	250	7485	10.6	129.5	54.1
ISHB-350	350	250	8591	11.6	149.3	53.4

(b) A simply supported beam of 6m span supports an RCC slab wherein the compression flange is embedded. The beam is subjected to a dead load of 25 KN/m and superimposed load of 20 KN/m. over entire span. Design the beam.

(c) Design a single unequal angle strut connected by 6mm fillet weld at the ends with its longer leg on gusset plate of 10mm thickness. It carries a service load of 50 KN. The centre to centre distance between intersections is 3 m and $f_y = 250 \text{ N/mm}^2$



SECTION-II

- Q.4** **Answer Any Six out of Eight** (18)
- (a) Explain several purposes for source reduction.
 - (b) Explain anaerobic microbial degradation in detail.
 - (c) Explain environmental effects due to landfill.
 - (d) Define objectives of incineration process.
 - (e) Explain monitoring procedure for land filling detail.
 - (f) Provide list of components of biogas plant. Explain any one type of digester.
 - (g) List various materials in source reduction.
 - (h) What are the environmental effects of landfill process?

- Q.5** **Answer Any Four out of Six** (16)
- (a) Explain how recycling of solid waste takes place and list its advantages?
 - (b) Explain in details various factors affecting site selection for landfill of sanitary waste.
 - (c) Explain the significance of recycling process.
 - (d) What are different law enforcement options available for effective SWM implementation?
 - (e) Explain landfill gas emission in sanitary landfill in detail.
 - (f) Explain various factors involved in planning process for any recycling programme.

- Q.6** **Answer Any Two out of Three** (16)
- (a) List and explain the factors that you will consider while planning a recycling programme.
 - (b) Provide list of commonly recycled material and explain any three in details.
 - (c) Explain various planning parameters for an incineration facility.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY- 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: GEOTECH. ENGINEERING
SEAT NO. _____
SEMESTER: IV
PROGRAMME: CIVIL ENGG.
CODE: 160125

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt **all** questions.
- (3) All Questions are compulsory.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Illustrate your answers with neat sketches, wherever necessary.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.
- (8) The student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION - I

- Q.1 Attempt any Six (18)**
- (a) State importance of soil in civil engg. Structures.
 - (b) Enlist field applications of geotechnical engg.
 - (c) Define: i) Void ratio ii) porosity.
 - (d) Define : i) Liquid limit ii) Plastic limit
 - (e) Write formula for coefficient of curvature.
 - (f) What do you mean by classification of soil?
 - (g) Draw a neat graph for atterberg limits
 - (h) Define permeability of soil.
- Q.2 Attempt Any Four (16)**
- (a) State relation between porosity (n) & void ratio (e).
 - (b) A soil sample of volume 160cc weighs 304gms, when partially saturated. If weighs 269.28gm when fall dry, sp. gravity of soil 2.64. Determine porosity, void ratio, water content and degree of saturation.
 - (c) Explain applications of consistency limits.
 - (d) Explain with neat sketch liquid limit test.
 - (e) Explain with neat graph particle size distribution curve.
 - (f) Explain factors affecting permeability.
- Q.3 Attempt any Two (16)**
- (a) An undisturbed soil sample has volume of 100cc. Its weight is 190gms. After drying is oven the weight reduced to 160gmd. If specific gravity is 2.68. Find water content, void ratio, degree of saturation.
 - (b) Explain procedure of sieve analysis.
 - (c) Explain falling head permeability test. Draw a neat sketch.

SECTION-II

Q.4

Answer any Six

(18)

- (a) Define cohesion & angle of internal friction in a soil.
- (b) Define compaction & consolidation in a soil. What is difference between them?
- (c) Give the neat graph sketches of C- soil, C Ø soil & Ø soil.
- (d) Draw the neat sketch of standard proctor test apparatus & give specification.
- (e) Define safe bearing capacity & ultimate bearing capacity of soil.
- (f) Explain earth pressure at rest, Active earth pressure & passive earth pressure.
- (g) Explain the necessity of soil stabilization.
- (h) Write any three factor affecting the soil compaction.

Q.5

Answer any Four

(16)

- (a) Explain unconfined compression test.
- (b) Explain standard Proctor test.
- (c) Explain any two methods of soil stabilization.
- (d) Explain any Two field methods of compaction of soil.
- (e) Write the assumptions made in Terzaghi's analysis.
- (f) Explain Mohr-coulomb equation and failure envelop.

Q.6

Answer any Two

(16)

- (a) Triaxial test conducted as two soil specimen has the following data.

Specimen	Carbine pressure	Normal stress
1	20MPa	60MPa
2	30MPa	80MPa

Draw failure envelopes & find 'C' and 'Ø' of the sample.

- (b)

In a compaction test on a soil sample following data were observed

Moisture content Is %	14	16	18	20	22	24	26
Bulk density of soil gm/cc	1.76	1.82	1.88	1.96	2.00	1.90	1.80

Find by graph max dry density (MDD) and optimum Moisture Content (OMC)

- (c) Explain the triaxial shear test in detail.
